

## Case 3561

### ***Anchisaurus* Marsh, 1885 (Dinosauria, Sauropodomorpha): proposed conservation of usage by designation of a neotype for its type species *Megadactylus polyzelus* Hitchcock, 1865**

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**Abstract.** The purpose of this application, under Article 75.5 of the Code, is to conserve the usage of the name *Anchisaurus* Marsh, 1885 (Lower Jurassic, Connecticut Valley, northeastern U.S.A.) that is based on *Megadactylus polyzelus* Hitchcock, 1865. It is proposed to replace the fragmentary and non-diagnostic holotype of *M. polyzelus* with a diagnostic neotype, an almost complete skull and skeleton (YPM 1883, holotype of *A. colurus* Marsh, 1891). This specimen has formed the basis for the concept of *Anchisaurus*, the first basal sauropodomorph genus from the U.S.A. and still the best represented from there since it was illustrated by Marsh (1892, 1893), and of *A. polyzelus* since it was illustrated by Galton (1976). *Anchisaurus* is the basis for ANCHISAURIDAE Marsh, 1885, the first basal sauropodomorph family to be named, and for the Anchisauria Galton & Upchurch, 2004.

**Keywords.** Nomenclature; taxonomy; Dinosauria; Sauropodomorpha; *Anchisaurus*; *Ammosaurus*; *Megadactylus*; *M. polyzelus*; Lower Jurassic; northeastern U.S.A.

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1. The few articulated skeletal remains of dinosaurs discovered in the 1800s in the Lower Jurassic of North America were found in the Connecticut Valley, northeastern U.S.A., and most represent what are now regarded as basal sauropodomorph dinosaurs (specimens described by Galton, 1976; see citations therein for figures in Marsh, 1889, 1892, 1893, 1896; Lull, 1915, 1953; Huene, 1906, 1908, 1914a, 1932; see also Yates, 2004; 2010; Fedak & Galton, 2007).

2. J. Wyman (in Hitchcock, 1858, p. 187) mentioned a whole collection of bones, including imperfect caudal vertebrae, parts of a thigh bone and parts of a foot from Springfield, Massachusetts, which were discovered after blasting operations. These bones were named *Megadactylus polyzelus* by Hitchcock (1865, p. 39), who figured the 'right foot' (i.e. pes) (Pl. IX, fig. 6). The species was re-described by Cope (1870, p. 122A-E, pl. XIII; as *Megadactylus*, p. 122A; first use of *M. polydactylus*, p. 122E), based on this and other parts of the holotype (ACM 41/109). He first recognized it as a dinosaur and described the pes as a 'right anterior foot', i.e. manus (Cope, 1870, p. 122B). The holotype consists of 10 incomplete vertebrae (dorsals, sacral 1 and 2, caudals), three incomplete ribs, the proximal left scapula, the distal left radius, ulna, and manus (right manus reidentified as left by Galton & Fedak, 2007, p. 248), the cojoined distal ischia, the left femur (length ~178 mm), fibula, proximal tibia and the complete metatarsal IV, the proximal right metatarsal II, and the pedal phalanx 1 of

digit III (figured by Marsh, 1892, 1896; Huene, 1914a; Lull, 1915, 1953; Galton, 1976).

3. Marsh (1877, p. 344; not 1882, p. 84 as always cited) cited this genus as *Amphisaurus* (*Megadactylus*) with no explanation of the reason for the new synonym *Amphisaurus*. In fact *Megadactylus* Hitchcock, 1865 was already preoccupied by *Megadactylus* Fitzinger, 1843 (Lacertilia), a fact not mentioned by Marsh (1877, 1882). Finally Marsh (1885, p. 169) replaced *Amphisaurus* Marsh, 1877 (preoccupied by *Amphisaurus* Barkas, 1870, in Reptilia) with *Anchisaurus* Marsh, 1885.

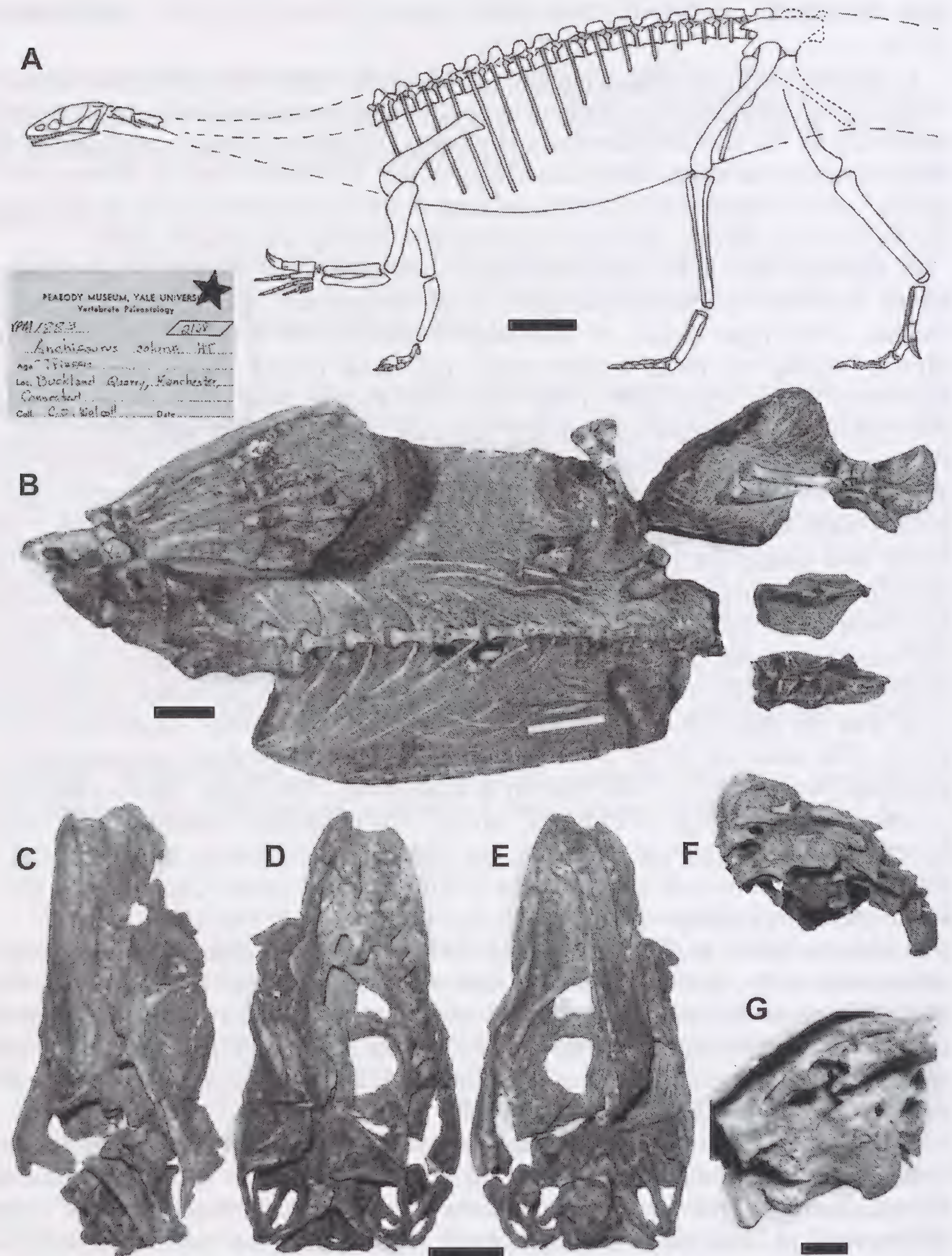
4. Marsh (1889, 1891, 1892) described three additional species of *Anchisaurus* based on three articulated skeletons from Manchester, Connecticut. *A. major* Marsh, 1889 (type species of *Ammosaurus* Marsh, 1891; family AMMOSAURIDAE Huene, 1914b) was based on the largest individual (YPM 208, femur ~285 mm, figured by Marsh, 1892, 1896; Lull, 1915, 1953; Huene, 1906, 1908, 1914a; Galton, 1971, 1976). The medium-sized, nearly complete skeleton (YPM 1883, Fig. 1, femur ~211 mm) has an almost complete skull and was named *Anchisaurus colurus* Marsh, 1891 (figured by Marsh, 1892, 1893, 1896; Huene, 1906, 1908, 1914a, 1932; Galton, 1976; Fedak & Galton, 2007; Yates, 2004, 2010). *Anchisaurus colurus* Marsh, 1891 is the type species of *Yaleosaurus* Huene, 1932. YPM 1883 was the basis for the skeletal reconstruction of *Anchisaurus colurus* by Marsh (1893, 1895, 1896), which has been reproduced many times since, also for that by Huene (1932) for *Yaleosaurus colurus*, and for more recent reconstructions of *Anchisaurus polyzelus* (Galton, 1971, 1973, 1976; Galton & Cluver, 1976; Paul, 2010; Yates, 2010). YPM 1883 was the basis for the skull reconstructions of *Anchisaurus colurus* by Marsh (1893, 1896; also Lull, 1915, 1953), and for more recent cranial reconstructions of *A. polyzelus* (Galton, 1976, 1990; Galton & Upchurch, 2004; Yates, 2010). The bones of the smallest skeleton (YPM 209, femur ~110 mm) were described as *A. solus* Marsh, 1892. It is almost complete, but the bones are poorly preserved and it represents a juvenile individual (figured by Huene, 1906, 1914a; Galton, 1971, 1976; Fedak & Galton, 2007).

5. Huene (1914a, p. 75) referred to ACM 41/109 as *Thecodontosaurus polyzelus* (Hitchcock, 1865), placing it in a genus known from the Upper Triassic of England. Lull (1915) pointed out that this left *Anchisaurus colurus* Marsh, 1891 unassigned to any genus. This situation was resolved when Huene (1932) made it the type species of his new genus *Yaleosaurus* Huene, 1932, a generic name that was used subsequently by Lull (1953) and Colbert (1970).

6. The various taxonomic assignments for the four nominal species of *Anchisaurus* were summarized by Galton (1971, 1976), who recognized two taxa of anchisaurids as basal sauropodomorphs, i.e. *Anchisaurus polyzelus* (which he considered a senior synonym of *A. colurus*) and *Ammosaurus major* (which he considered a senior synonym of *A. solus*). However, the characters used to distinguish these two genera (Galton, 1976, 1990; Galton & Upchurch, 2004; Upchurch et al., 2007) have been considered to represent ontogenetic differences, preservational differences, errors in reconstruction, and inaccurate measurements (see Sereno, 2007; Yates, 2004, 2010).

7. Sereno (1999) listed '*Ammosaurus* (= *Anchisaurus*)' but no reason was given for the synonymy.

8. Based on an apomorphy, the flattened coplanar ischial shafts, Yates (2004) synonymised *A. colurus* (also *A. major* and *A. solus*) with *A. polyzelus*. His



**Fig. 1.** YPM 1883, holotype of *Anchisaurus colurus* Marsh, 1891, proposed neotype for *Megadactylus polyzelus* Hitchcock, 1865, type species of *Anchisaurus* Marsh, 1885, from the Lower Jurassic of Manchester, Connecticut, U.S.A.: (A) skeletal reconstruction in left lateral view; (B) specimen as preserved; (C–G) slightly crushed skull as preserved: (C–F) in approximate views: (C) left lateral; (D) dorsal; (E) ventral and (F) occipital; (G) detail of braincase in left lateral and slightly ventral view. For stereo photographs and labeled outline drawings comparable to B, D and E (with skull prior to further preparation), see Galton (1976, figs. 11, 12A, B); for labeled outline drawings comparable to C, F and G, see Galton & Fedak (2007, figs. 1B, 3A, C); A and B modified from originals used in Galton (1976); museum label from M. Fox (YPM). Scale bars represent (A) 100 mm, (B) 50 mm, (C–F) 20 mm and (G) 10 mm.

synonymization of *Ammosaurus major* with *Anchisaurus polyzelus* was further supported by three additional apomorphies.

9. Sereno (2007) questioned the validity of the character ‘flattened coplanar ischial shaft’ for ACM 41/109 and regarded *Anchisaurus polyzelus* as a nomen dubium. He diagnosed *Ammosaurus major* based on one vertebral and one iliac character of the holotype (YPM 208) and, because both characters are also present in YPM 1883, he regarded *Anchisaurus colurus* as a junior synonym of *Ammosaurus major*.

10. Based on two autapomorphies of *Anchisaurus polyzelus* present in the holotype (ACM 41/109), i.e. (1) a slender first sacral rib with its base occupying less than half the length of the first sacral centrum and (2) dorsoventrally flattened ischial blades set at a low angle to each other, Yates (2010) referred YPM 208 (holotype of *Anchisaurus major* Marsh, 1889) and YPM 1883 (holotype of *Anchisaurus colurus* Marsh, 1891) to *Anchisaurus polyzelus*. Three additional autapomorphies for *A. polyzelus* are present in these referred specimens, i.e. (3) posterior dorsal centra that are about twice as long as the height of the centrum face; (4) a foramen, or pit, opening ventrally on the base of the second sacral rib and (5) a long, narrow iliac preacetabular process that is at least twice as long as its basal height (Yates, 2010). Extra autapomorphies for *Anchisaurus polyzelus* are only observable in YPM 1883, i.e. (6) the transversely expanded ventral ramus of the postorbital and (7) a lateral pit on the distal part of the quadrate (Yates, 2004, 2010).

11. Autapomorphies 1 and 2 for the holotype of *Anchisaurus polyzelus* are also present in *Leoneosaurus taquetrensis* Pol et al., 2011 (Lower Jurassic, Argentina). Character 2, which is indeterminable for YPM 1883, is also present in *Asylosaurus yalensis* Galton, 2007 (Upper Triassic, England). Consequently, *Anchisaurus polyzelus* is a nomen dubium. Characters 3–5 are then autapomorphies of *Ammosaurus major* as shown by the holotype (YPM 208) and referred specimen (YPM 1883). However, character 3 is also present in SAM-900 [Galton & Cluver, 1976, fig. 2; Lower Jurassic, South Africa; holotype of “*Gyposaurus*“ (?*Anchisaurus*) *capensis* Broom, 1911], character 4 is not present in YPM 1883, and character 5 is also present in *Leoneosaurus taquetrensis* (Pol et al., 2011).

12. Sereno (2007) used the name *Ammosaurus major* instead of *Anchisaurus polyzelus* for YPM 208, 209 and 1883 but, as noted above, the autapomorphies for this taxon as exhibited by the holotype YPM 208 are rather tenuous and, if YPM 1883 represents a separate taxon [*Yaleosaurus colurus* (Marsh, 1891)], then it would possess characters 6 and 7. However, YPM 1883, the most complete skeleton (only lacking part of the neck and the tail; see Huene, 1906, pls. I-III, 1914a, figs. 1, 7–11; Galton, 1976, figs. 11, 12, 15–22; for skull see Galton, 1976, figs. 13, 14A-H; Fedak & Galton, 2007, figs. 1, 3, 4, 7, 8; Yates, 2004, figs. 3–8, 9D, 2010, figs. 1, 5, 6C) from the Connecticut Valley, has since 1976 formed the basis for the concept of *Anchisaurus*, the first basal sauropodomorph genus from the U.S.A. and still the best represented since its description by Marsh (1892, 1893), and also for the concept of *A. polyzelus*. *Anchisaurus* is the basis for ANCHISAURIDAE Marsh, 1885, the first basal sauropodomorph family to be named, and the Anchisauria Galton & Upchurch, 2004. In the absence of a Commission’s ruling, *Yaleosaurus* Huene, 1932, a name last used by Colbert (1970), would apply to the concept that for the last 35 years has been uniformly considered as *Anchisaurus*. A list of 75 post-1976 references demonstrating the usage of the name *Anchisaurus* is submitted to the Secretariat. In most cases

contextually the reference is to YPM 1883 and in some cases is specifically mentioned. References after 2007 usually also include *Anchisauria*. This list does not include references cited in this application.

13. Because the taxonomic identity of the nominal species of *Megadactylus polyzelus*, the type species of *Anchisaurus*, cannot be determined from its existing name-bearing type, and stability and universality are threatened thereby, the Commission is requested to use its plenary power under Article 75.5 to set aside the existing name-bearing type and to preserve current usage by designating YPM 1883 (Fig. 1) as the neotype. The specimen has been extensively illustrated in the literature (see section 12) with many of the figures as photographs (for stereo photographs see Galton, 1976, figs. 11–13, 18).

14. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to set aside all previous type fixations for the nominal species *Megadactylus polyzelus* Hitchcock, 1865 and to designate specimen YPM 1883 in the Peabody Museum of Natural History of Yale University as the neotype;
- (2) to place on the Official List of Generic Names in Zoology the name *Anchisaurus* Marsh, 1885 (gender: masculine), type species by monotypy *Megadactylus polyzelus* Hitchcock, 1865;
- (3) to place on the Official List of Specific Names in Zoology the name *polyzelus* Hitchcock, 1856, as published in the binomen *Megadactylus polyzelus* and as defined by the neotype designated in (1) above, specific name of the type species of *Megadactylus* Hitchcock, 1865.

#### Institutional abbreviations:

ACM: Amherst College Museum, Amherst, Massachusetts, U.S.A.; SAM: South African Museum (Iziko Museums of Cape Town), Cape Town, South Africa; YPM: Peabody Museum of Natural History, Yale University, New Haven, Connecticut, U.S.A.

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Acknowledgement of receipt of this application was published in BZN **68**: 94.

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